Detection of Malondialdehyde Levels and Superoxide Dismutase Activities in Renal Tissues of Nonobese Diabetic Mice

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Dear Sir,

Malondialdehyde (MDA) levels or superoxide dismutase (SOD) activities in renal tissues of nonobese diabetic (NOD) mice were studied. Recently, Tochino et al. [1] reported that renal involvement in newly established NOD mice developed spontaneously despite insulin treatment. It was postulated that the progression and/or exacerbation in patients with diabetic nephropathy might be correlated with the activities of reactive oxygen species. Renal tissues were obtained from 19 NOD mice. NOD mice were sacrificed at 12 weeks (younger NOD mice) or 36 weeks (elder NOD mice) after birth according to previous results [2]. Five C57BL mice were also sacrificed at 36 weeks after birth as controls. Renal tissues were divided into the cortex and medulla, and then homogenized with 1.15% KC1 or 0.25 M sucrose solution for the measurement of MDA levels or SOD activities, respectively. Measurement of MDA levels in the renal cortex and medulla was performed by the thiobarbituric acid test [3]. The activities of SOD in such samples were measured by the modified method of Oyanagi [4]. Immunofluorescence and light-microscopic examinations were also performed as described previously [2]. The levels of MDA and SOD activities in the renal cortex or medulla of NOD mice were significantly increased compared with those of C57BL mice. The levels of MDA and SOD activities in the renal cortex of NOD mice were significantly higher than those in the renal medulla. An increase of MDA levels and SOD activities in such samples was particularly observed in elder NOD mice. However, no increase of MDA levels or SOD activities in the renal cortex or medulla was observed in C57BL mice sacrificed at 36 weeks after birth. It appeared that the increase of MDA levels and SOD activities in elder NOD mice might not be due to aging. The levels of fasting blood sugar, and urinary glucose or protein were increased in elder NOD mice. The immunofluorescent

patterns of IgG, IgA, IgM or C3 deposition in glomeruli of NOD mice were changed from diffuse linear, focal and/or local fine granular to diffuse granular depending on the age. In elder NOD mice, thickening of the glomerular basement membrane and widening of the glomerular mesangium were marked in light-microscopic examinations. It appears that the reactive oxygen

species might induce glomerular injuries in NOD mice. It is concluded that measurements of MDA levels and SOD activities in renal tissues of NOD mice are useful for evaluation of the pathogenesis of renal involvement in patients with diabetes mellitus. Further investigations to clarify the relations among the activities of reactive oxygen species or mesangial cells, and glomerular deposition of immunoglobulins or complement are warranted in patients with diabetic nephropathy.

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